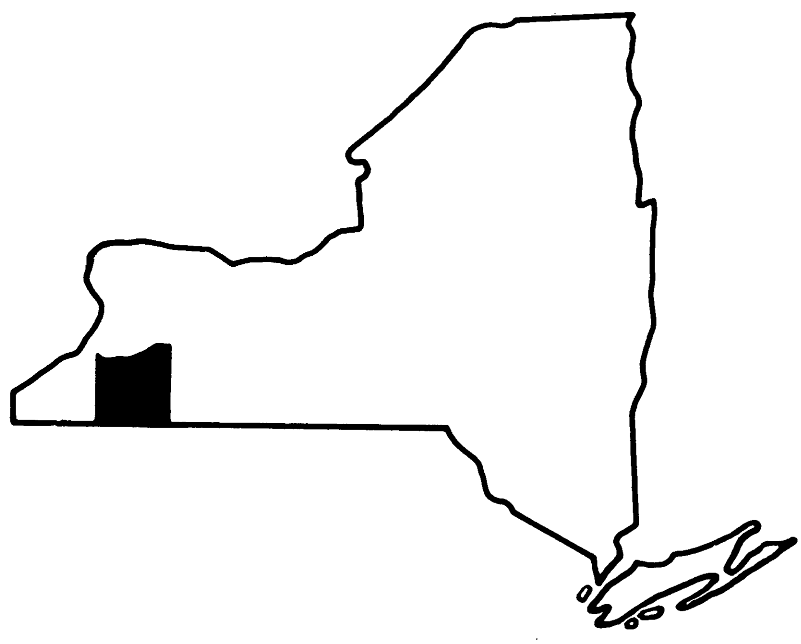
FLOOD INSURANCE STUDY

VILLAGE OF PORTVILLE, NEW YORK
CATTARAUGUS COUNTY



OCTOBER 1977

U.S. DEPARTMENT of HOUSING & URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

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FLOOD INSURANCE STUDY
VILLAGE OF PORTVILLE, NEW YORK

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the Village of Portville, Cattaraugus County, New York, and to aid in the administration of the Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert Portville to the regular program of flood insurance by the Federal Insurance Administration (FIA). Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

At a Consultation and Coordination (CCO) meeting on July 29, 1975, with representatives of the Village of Portville, the FIA, the Cattaraugus County Planning Board, the New York State Department of Environmental Conservation, the United States Department of Agriculture, Soil Conservation Service (SCS), and the United States Army Corps of Engineers (COE), the purpose of the Flood Insurance Study was explained. It was agreed at the meeting that the study would use the hydrologic and the hydraulic procedures presently being used in the preparation of a Flood Plain Information Report by the COE for the Allegheny River.

A search for basic data was made at all levels of government. The COE and the SCS provided information which served as part of the input for the hydraulic analysis. The U. S. Geological Survey (USGS) was contacted to obtain contour maps.

On November 4, 1976, a meeting was held with officials of the village to obtain additional local input. The final CCO meeting was held on January 27, 1977, where the final draft of the Flood Insurance Study was presented for further local comment.

1.3 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by the New York State Department of Environmental Conservation for the Federal Insurance Administration, under Contract No. H-3856. This work, which was completed in January 1977, covered all flooding sources in the Village of Portville.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the area of the Village of Portville. The area of study is shown on the Vicinity Map (Figure 1).

Because of the development within the flood plain areas, it was agreed between the FIA and the Village of Portville that the Allegheny River (1.00 mi.) and Dodge Creek (0.97 mi.) would be studied in detail. Lillibridge Creek was studied by the approximate method because of the lack of development and moderately steep overbank slopes.

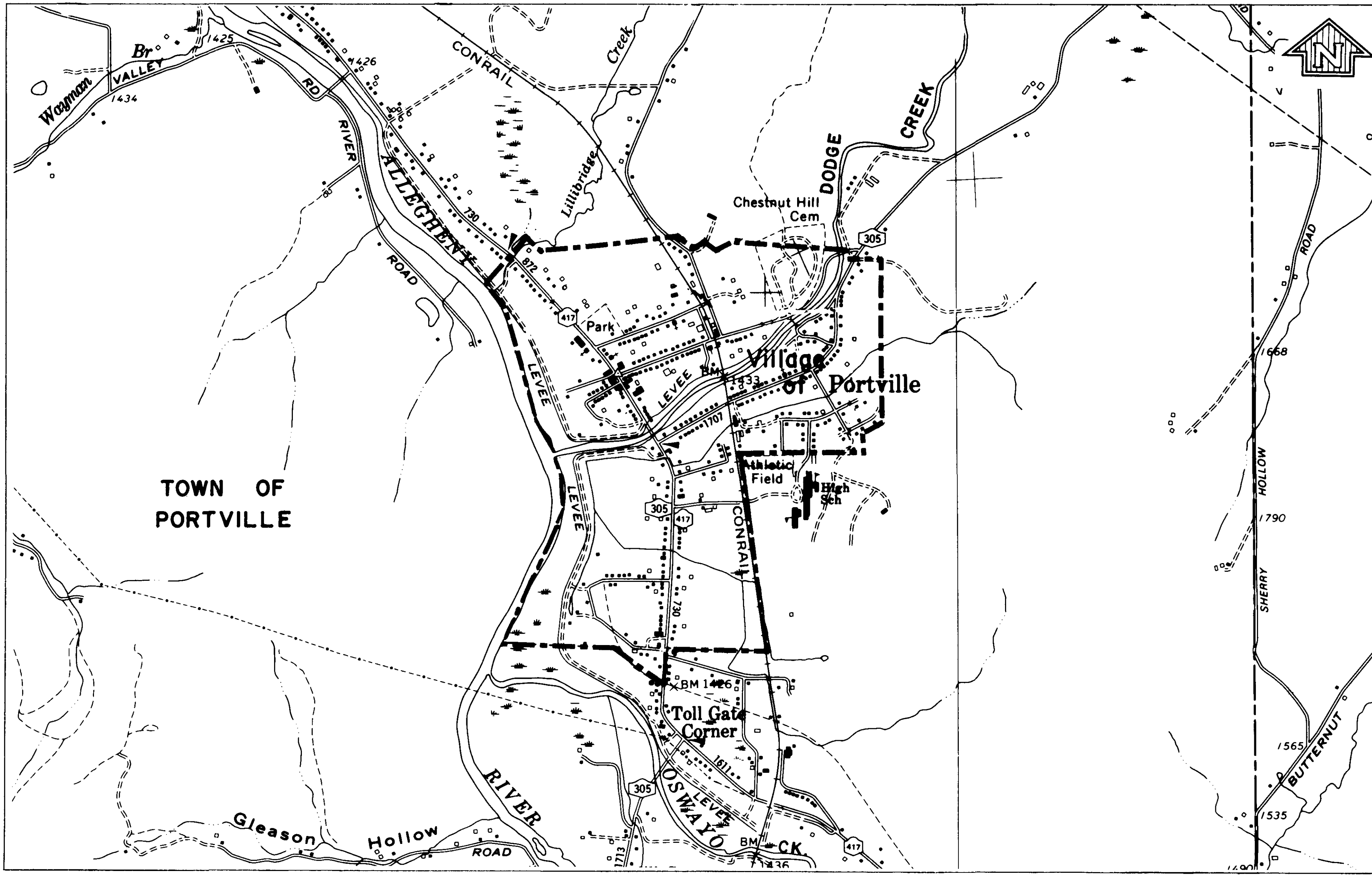
The areas studied in detail were chosen with consideration given to all forecasted development and proposed construction for the next five years (through March 1980).

2.2 Community Description

The Village of Portville is located in the southern center of the Town of Portville, southeastern corner of Cattaraugus County, western New York State. It has an area of 0.5 square miles. The community is flat with elevations ranging between 1,430 and 1,560. The soil is mostly till and glacial deposits (Reference 1). The average annual temperature is about 46°F. Precipitation is approximately 37.0 inches per year and runoff, 21 inches (Reference 2).

The village was incorporated in 1895. Its population has been relatively stable over the last thirty years. The population was 1,336 people in 1960 and 1,304 people in 1970 (Reference 3).

Most of the village is located within the flood plains of the Allegheny River, Dodge Creek, and Oswayo Creek. Continuing development, without the protection of adequate land use controls, is likely to take place in or on the edges of flood prone areas due to its ease of development.



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF PORTVILLE, NY
(CATTARAUGUS CO.)

APPROXIMATE SCALE
2000 0 2000 4000 6000 FEET

VICINITY MAP

FIGURE 1

The Allegheny River begins in the Commonwealth of Pennsylvania, flows into New York State at the midpoint of the southern boundary of the Town of Portville. It then flows through the south central part of the town forming the western corporate boundary for the village, thence back into Pennsylvania to the City of Pittsburgh where it joins with the Monongahela River to form the Ohio River.

Dodge Creek begins in the Town of Clarksville, Allegany County and flows into Cattaraugus County near the middle of the east boundary of the Town of Portville. It enters the Village of Portville at the northeast corner and flows in a southeasterly direction until it meets the Allegheny River at the middle of the village's western corporate boundary.

2.3 Principal Flood Problems

The most frequent floods in the study are a result from winter or spring rainfall, usually augmented by melting snow. There is no gaging station located in the village. The maximum discharge of Allegheny River at Portville occurred during Tropical Storm Agnes in June 1972. The closest recorded discharge during that storm on the Allegheny River was 59,000 cubic feet per second (cfs) at Olean, N.Y. (Reference 4). The maximum recorded discharge of Dodge Creek at Portville (drainage area 45.7 square mi.) was 4,200 cfs which occurred June 23, 1972 (Reference 5).

The flood by Tropical Storm Agnes in June 1972 caused low lying business sections to submerge, two thirds of the population to be evacuated, and many homes to be flooded (Reference 4).

Photos which show the Village of Portville during the June 1972 flood by Tropical Storm Agnes are included as Figures 2 and 3.

2.4 Flood Protection Measures

The Allegheny River is diked on the eastern side and Dodge Creek has embankments on both sides. The measures were completed by the COE in 1951-52 and are maintained by the State of New York. During times of high stage on the Allegheny River, backwater is prevented from occurring on Lillibridge Creek by means of a flap valve of the outflow of a culvert through the levee.

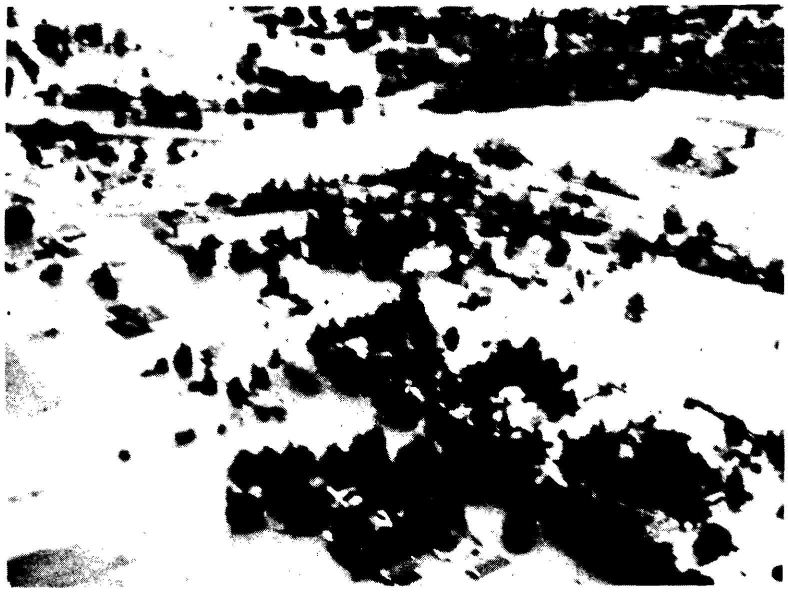


Figure 2 - Oswayo Creek just above confluence with Allegheny River (1972 Agnes Flood).

Figure 3 - Confluence of Allegheny River and Dodge Creek (1972 Agnes Flood). Note flood protection levees. Oswayo Creek in far background.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect current conditions in the drainage areas of the streams.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each stream studied in detail in the community.

The peak discharge-frequency relationship was primarily based on statistical analyses of stage and discharge records at the National Weather Service/City of Olean recording gage at Olean, N.Y. and the USGS recording gage at Eldred, Pa.

The Olean gage is located at the Olean Sewage Disposal Plant approximately 1.6 miles downstream of Olean Creek on the north bank of the Allegheny River. The gage has been read daily since it was installed by the City of Olean in November 1942.

The National Weather Service made daily readings from a staff gage installed by the COE on the Union Street bridge over the Allegheny River at Olean from 1909 to 1920 and from 1929 to 1938. The Union Street bridge gage was located approximately 0.5 mile downstream of Olean Creek.

Since there is little difference in drainage area, the record at the Union Street gage was considered consistent with the record at the Olean sewage disposal plant. Peak flows were estimated between 1938 to 1942 to provide a record for analysis from 1930 to 1974.

Investigation of all other available hydrologic data was made to aid in the determination of historical peak flood discharges at Olean. Using a log-Pearson Type III distribution of the peak flow data as outlined by the Water Resources Council Bulletin No. 17 (Reference 6), the values of the 10-, 50-, 100- and 500-year peak discharges were obtained.

The Olean frequency was then adjusted to the frequency at the USGS gage at Salamanca by a flow relation between the two gages. The flow relation was developed by analyzing peak flows during the period 1930-74. This adjustment was done to take advantage of the Salamanca gage's longer period of record, 1904-74. The Salamanca gage is located 239 feet upstream of the Main Street bridge on the south bank approximately 21.4 miles downstream of the Olean gage.

The gaging station at Eldred, Pa., was established by the USGS in 1939, upstream of State Highway 346 bridge. The original gage installed in 1915 and abandoned in 1939 was located approximately 7.5 miles further upstream at the Route 6 bridge at Larabee. Since there is little difference in drainage area the record at Larabee was considered consistent with the record at Eldred. Since partial records are available at Larabee prior to 1921, a period of 1921-74 was used for analysis. Investigation of all other available hydrologic data was made to aid in the determination of historical peak flood discharges at Eldred. Using a log-Pearson Type III distribution of the peak flow data, the values of the 10-, 50-, 100- and 500-year peak discharges were obtained.

The frequency flows between the Olean and Eldred gages were then hydrologically proportioned.

A synthetic rainfall-runoff relationship method, based on a dimensionless unit hydrograph, was used to develop flood flow-frequency relationships for Dodge Creek. The 24-hour rainfall amounts for frequencies up to 100 years, as obtained from the Rainfall Frequency Atlas of the United States (Reference 7), were plotted on log-normal paper and the rainfall amount for the 500-year frequency was extrapolated from the resulting graph.

The watershed of each stream was divided into subareas to evaluate the hydrologic effects of as many tributaries as would be significant.

The computer program TR-20 (Reference 8), developed by the SCS was used to compute surface runoff. It takes into account conditions affecting runoff such as land use, type of soil, shape and slope of watershed, and antecedent moisture condition. It develops a hydrograph and routes the hydrograph through stream channels and reservoirs. The program is designed to combine the routed hydrograph with those from tributaries and print out the total composite hydrograph peak discharges, and times of occurrence at each desired point in the watershed for each storm evaluated. From this data frequency discharge, drainage area curves were plotted for each evaluation point.

A summary of discharges for the Allegheny River and Dodge Creek is shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
DODGE CREEK					
Cross Section A	45.6	2,782	4,013	4,606	5,791
Upstream Corporate Limits	45.5	2,778	4,008	4,600	5,784
ALLEGHENY RIVER					
Downstream Corporate Limits	912.0	20,900	32,500	39,900	59,500
Upstream Corporate Limits	865.0	19,750	30,800	37,750	56,350

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams studied in detail in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these streams.

Cross section data for the Allegheny River and Dodge Creek was obtained from aerial photography and field surveys. (Elevations came from a continuation of profiles which began at Salamanca, 29.7 miles downstream. All profiles checked into the Eldred gage within ±.2').

Roughness coefficients (Manning's "n") for the Allegheny River were developed by field inspection and verification of the June 1972 and September 1967 flood profiles. The roughness value for the main channel for this reach is 0.04; roughness values for the flood plain range from 0.10 to 0.15.

For Dodge Creek, the roughness coefficients (Manning's "n") were determined by field inspection and based on the National Engineering Handbook, Section 5 (Supplement B) (Reference 9). In arriving at a realistic value due weight was given to the irregularity, variations in shape and size of cross sections, characteristics of obstructions such as debris deposits, stumps, exposed roots, boulders, fallen and lodged logs, type of vegetation, and degree of meandering. The Manning's "n" values for Dodge Creek were 0.035 to 0.055 for the channel and 0.035 to 0.065 for the overbank areas.

Cross sections were located at close intervals above and below bridges, at control sections along the stream length, and at significant changes in ground relief and land use or land cover. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Boundary and Floodway Map (Exhibit 2).

Water-surface profiles for the Allegheny River were developed using the HEC-2 step-backwater model (Reference 10). Profiles were determined for the 10-, 50-, 100- and 500-year floods.

Flood profiles on Dodge Creek were calculated using the Soil Conservation Service WSP-2 Water-Surface Profiles Computer Program (Reference 11). For starting profile computations the tailwater elevations on the Allegheny River, as supplied by the COE, were used. This program uses the standard step method, with some modifications, to compute profiles between valley sections. All profiles are computed in the upstream direction. Therefore, only subcritical flow, a condition normally characteristic of natural streams, can be analyzed. For any supercritical flows encountered the program will assumed critical flow and resume computations.

The flood elevations as shown on the profiles are considered applicable so long as bridges remain unobstructed and channels retain their present capacities without alteration from scour, deposition, or significant vegetative growth.

Distance references used in the computer backwater analysis of the Allegheny River were based on the Corps of Engineers mile marker system. As a result there are discrepancies in lengths appearing in the computer output and the correct distances that appear on the mapping and the profiles in this report. This level of accuracy is consistent with the general method of calculations used in the backwater determinations and the low energy differential occurring along the reaches under analysis.

The 100-year floodway encroachment analysis of the Allegheny River was made to determine the floodway boundary. A type 10.4 study (equal conveyance) was made and then verified by a Type 9.1 study. For the most part, the encroachment profile is 0.7 to 0.9 foot higher than the natural profile. Reach lengths for the channel were measured along the centerline of channel between sections and overbank reach lengths measured along the approximate centerline of the effective out-of-channel flow area.

Flood profiles for the Allegheny River and Dodge Creek were drawn showing computed water-surface elevations to an accuracy of ±0.5 foot for floods of the selected recurrence intervals (Exhibit 1). All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as mean sea level datum with the 1929 General Adjustment; elevation reference marks used in the study are shown on the maps.

Approximate 100-year inundation limits for the small portion of Lillibridge Creek in the northwestern corner of the village were determined on the basis of the design ponding elevation when gravity flow through the flood control levee is impeded by high stages on the Allegheny River (Reference 12).

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For the reaches studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps developed for this study from aerial photographs at a scale of 1"=400' with a contour interval of 5 feet (Reference 13). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). Small areas within the flood boundaries may lie above the flood elevations, and therefore may not be subject to flooding; owing to limitations of the map scale or lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment in order that the 100-year flood can be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced.

To allow an increase in the water-surface elevation of the 100-year flood through encroachment would jeopardize the physical integrity of a local flood protection project designed for a 100-year, or other closely related event. Accordingly, no encroachment limits have been calculated for the reaches of the Allegheny River and Dodge Creek which are protected by levees or floodwalls. Floodway limits are thus equivalent to the 100-year flood inundation limits in these reaches. The entire land area of these flood protection projects is controlled by the State of New York with legal assurances in effect prohibiting encroachments which would increase water-surface elevations within project limits.

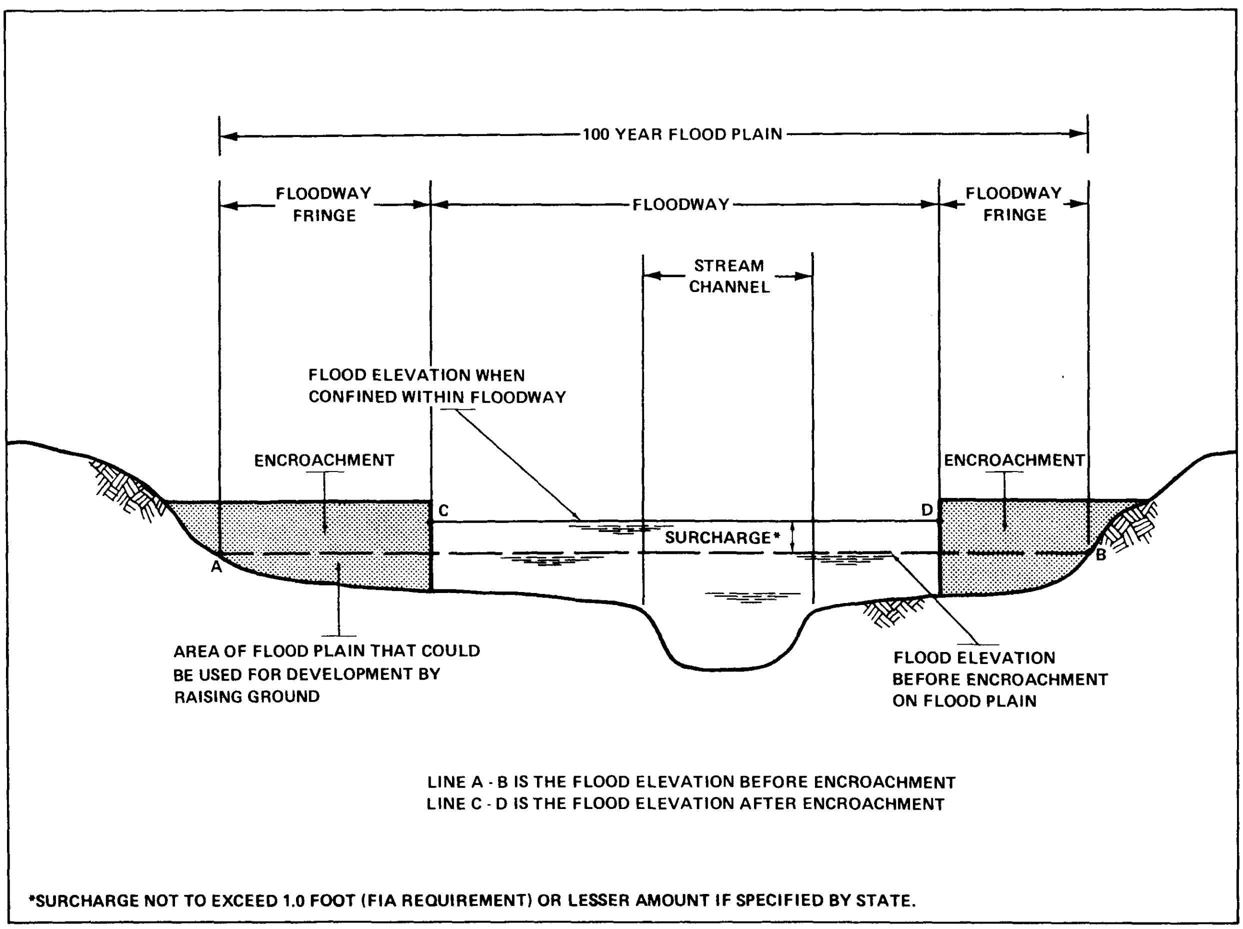
The western border of the village is the east bank of the Allegheny River and part of the floodway is located in the adjacent Town of Portville.

The floodways in this report are proposed to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodways were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations are tabulated at selected cross sections of each stream studied in detail (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway widths were determined at cross sections; between the cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or are collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 4.



FLOODWAY SCHEMATIC Figure 4

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Allegheny River							
A	581	1,410[2]	8,398	5.62	1,433.9	1,433.9	0.0
B	5,069	949[2]	16,958	3.31	1,436.4	1,436.4	0.0
Dodge Creek							
A	855	220	2,544	1.81	1,434.9	1,434.9	0.0
B	2,063	220	2,333	1.98	1,435.8	1,435.8	0.0
C	3,447	130	1,682	2.75	1,437.5	1,437.5	0.0
D	4,291	100	1,210	3.81	1,437.8	1,437.8	0.0

[1]FEET ABOVE ORIGIN OF STUDY

[2]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF PORTVILLE, NY
(CATTARAUGUS CO.)

FLOODWAY DATA

ALLEGHENY RIVER AND DODGE CREEK

TABLE 2

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF), and flood insurance zone designations for each flooding source studied in detail affecting the Village of Portville.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
2 to 7 feet	1.0 foot

Two reaches meeting the above criterion were required to establish flood insurance zones for the Village of Portville. These included one on the Allegheny River and one on Dodge Creek. The locations of the reaches are shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire area of study was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A11 and A12:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; and areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Village of Portville is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Allegheny River Reach 1	0001B	-6.0	-2.0	+3.8	060	A12	Varies
Dodge Creek Reach 1	0001B	-5.7	-2.0	+3.0	055	A11	Varies

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT – SEE MAP

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF PORTVILLE, NY
(CATTARAUGUS CO.)

FLOOD INSURANCE ZONE DATA

ALLEGHENY RIVER, DODGE CREEK AND LILLIBRIDGE CREEK

TABLE 3

6.0 OTHER STUDIES

There is no known Flood Plain Information Report for the reaches of the Allegheny River, Dodge Creek or through the Village of Portville. However, there is a Flood Plain Information Report for Olean, New York (Reference 14). There are Flood Insurance Reports being prepared for the Towns of Olean and Hindsdale which border the Town of Portville. There is also a Flood Insurance Report for the Town of Portville. No data disagreements occur between the studies.

This study is authoritative for purposes of the Flood Insurance Program and the data presented here either supersedes or are compatible with previous determinations.

7.0 LOCATION OF DATA

All data necessary to reproduce this Flood Insurance Study are being retained on file until January 1, 1982, at the New York State Department of Environmental Conservation, 50 Wolf Road, Albany, New York 12233. These data include base maps, topographic maps, cross sections survey data, backwater computations, and other supporting information.

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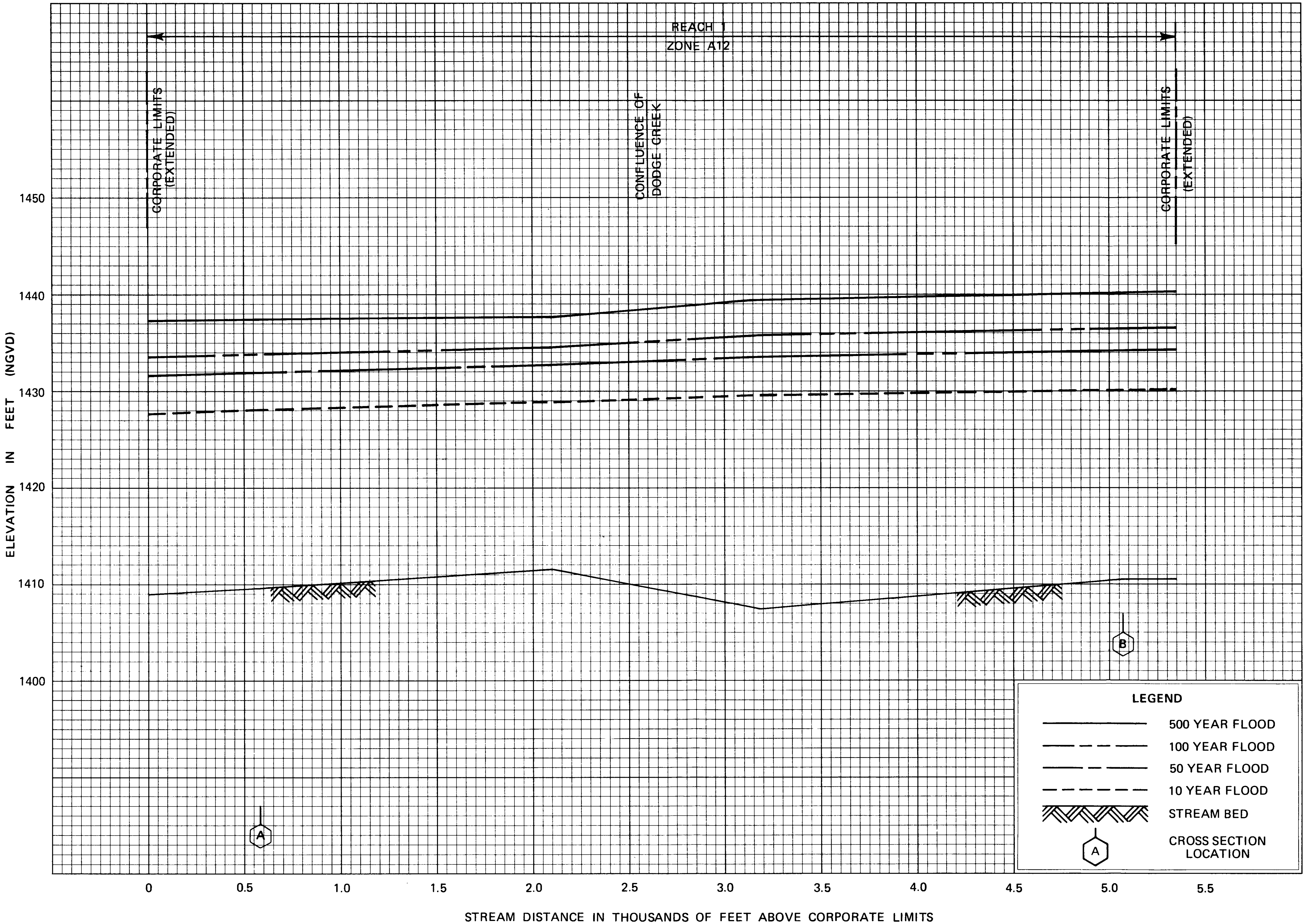

FLOOD PROFILES

ALLEGHENY RIVER

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF PORTVILLE, NY
(CATTARAUGUS CO.)

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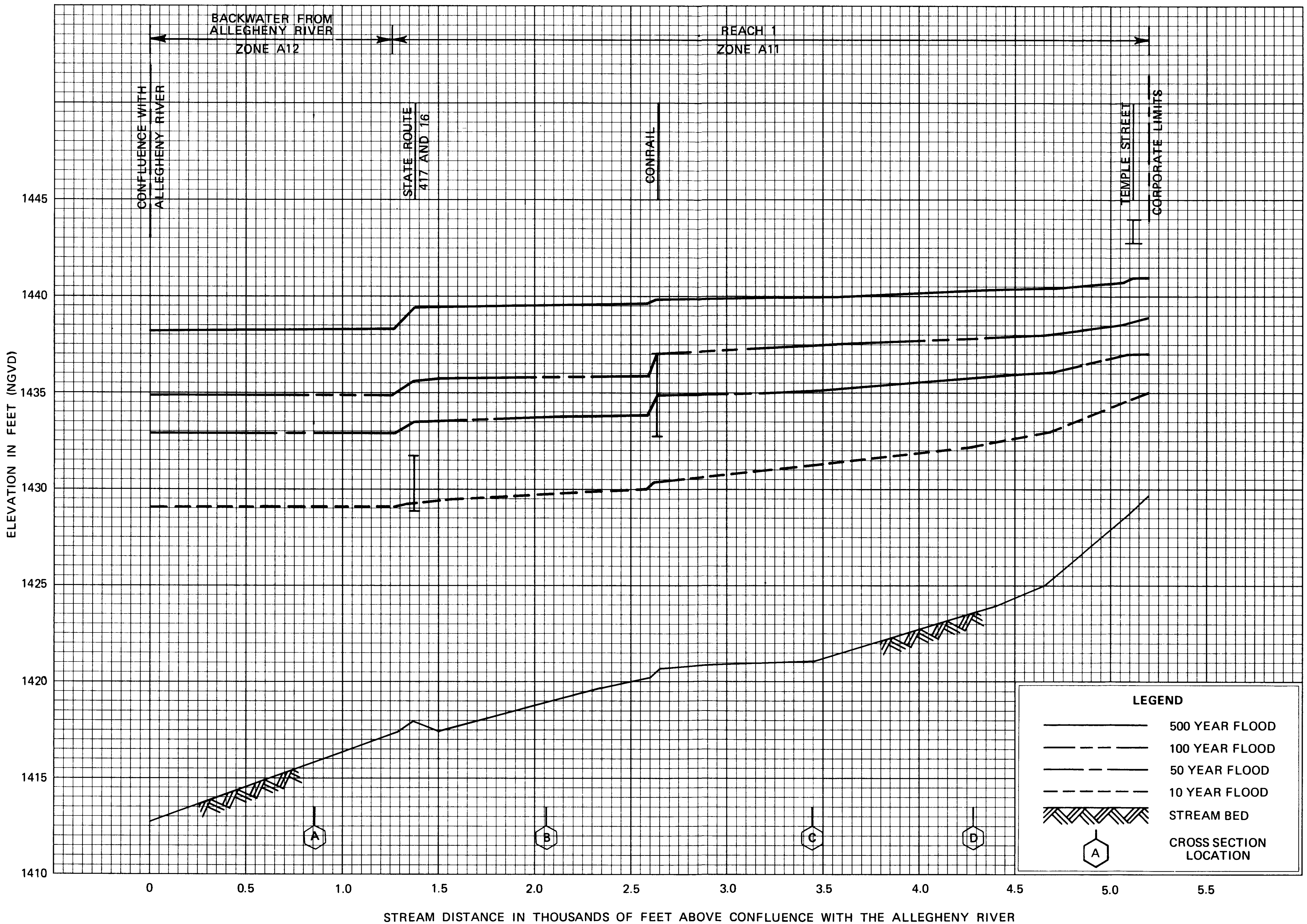

FLOOD PROFILES

DODGE CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF PORTVILLE, NY
(CATTARAUGUS CO.)

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